ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY

Integrated Functional Appraisal

Engineering Division

FY 2004

IFA Team Members

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Executive Summary

An Integrated Functional Appraisal of Engineering Division Operations was conducted in the spring of 2004. Because the Engineering Division spaces had been subjected to at least two and in many cases three wall-to-wall inspections during the preceding year, this IFA was strictly limited to operations requiring formal authorizations, with a close look at operations requiring medical approval and/or medical surveillance.

We found that all operations requiring formal authorization have the appropriate current formal authorizations, and they appear to be followed conscientiously. The Engineering Division also participates in the review of programmatic Activity Hazard Documents (AHDs) that involve Engineering Division personnel.

One-hundred percent of Engineering Division spaces have been reviewed for hazards within the last 12 months, and this is reflected in the Hazards, Equipment, Authorizations and Reviews (HEAR) database.

Staff that requires medical authorizations and medical surveillance are appropriately identified and enrolled in medical surveillance, with only one exception. A recommendation to improve the medical surveillance program to eliminate such exceptions is made.

Spaces are generally well maintained, with few general deficiencies. One exception is the large backlog of Occupational Safety and Health Administration (OSHA) machine-guarding deficiencies. The Division should address machine-guarding issues on a priority basis.

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1 Introduction

1.1 IFA Purpose

The Integrated Functional Appraisal (IFA) is a key component of Lawrence Berkeley National Laboratory's Integrated Safety Management (ISM) system. It is part of Core Function number 5 (Continuous Improvement) of the ISM concept, and forms one of the three tiers of the Laboratory's safety-assessment program that evaluates the ongoing effectiveness of divisions' Integrated Safety Management programs. Berkeley Lab's Environment, Health and Safety (EH&S) Division has been conducting IFAs of all Laboratory organizations since 1996, with each organization undergoing review every three years. The Engineering Division's last IFA was conducted during 2001.

1.2 Scope

This year the Engineering Division IFA scope was strictly limited to operations requiring formal authorizations.

The decision to limit the IFA in this manner was based on the fact that there had been at least two and in most cases three complete wall-to-wall inspections of the Engineering Division spaces during the preceding nine months: the OSHA inspection, a pre-OSHA walkthrough by the Engineering Division Safety Coordinator and the EH&S Division Liaison, and the annual self-assessment inspections.

The IFA covered all work requiring formal written authorizations. And instead of physical inspections of spaces, the IFA also focused on work requiring medical authorizations and/or medical surveillance.

Finally, we also addressed the issue of equipment-specific lockout/ tagout (LOTO) procedures.

2 Appraisal Process

2.1 Team

2.1.1 *Selection*

The appraisal team was selected by the Division Liaison, and it consisted mostly of personnel that routinely support the Engineering Division and are familiar with its operations and needs. A representative from the Berkeley Site Office (BSO) was assigned by the U.S. Department of Energy (DOE).

2.1.2 *Member Roles and Responsibilities*

Member	Function
Matt Kotowski	Team Lead, Division Liaison, Safety Engineer
Weyland Wong	Engineering Division EH&S Coordinator
Rob Connelly	Industrial Hygienist
Wendy Corr	Occupational Health Nurse
Ted Decastro	Laser Safety Officer
Tom Caronna	Electrical Safety Engineer
Robert Fox	Environmental Specialist
Warren Yip	BSO Representative

In addition to the team members, the team relied on assistance from Darren Bleuel, Health Physicist.

2.1.3 *Meetings*

The IFA Team met formally on the following occasions:

April 20, 2004	Opening Meeting
May 3, 2004	Discussion of Medical Authorization/ Surveillance Review
May 10	Review of Fixed Waste Treatment Units
May 28	Review of Medical Authorization/Surveillance
June 7	Discussion of Equipment Specific LOTO
August 9	Closing Meeting

2.2 Defining Appraisal Areas

2.2.1 *Document and Database Reviews*

All current formal authorizations were reviewed, and so was the HEAR database, the training database, the respiratory protection database, and the Chemical Inventory. Information in the Health Services Occupational Health Manager (OHM) database was reviewed on a sample basis to determine compliance with the requirements for medical authorizations and medical surveillance.

2.2.2 *Identification of Facility-Level Operations*

The Engineering Division has East Bay Municipal Utility District (EBMUD) permits to operate two fixed wastewater treatment units at Buildings 77 and 25.

2.2.3 *Identification of Medium- and High-Hazard Spaces and Operations*

Medium- and high-hazard spaces were identified by reviewing all formal authorizations currently in effect for the Engineering Division. Members of the team who are familiar with the operations in the Engineering Division were satisfied that there were no other higher hazard operations.

2.2.4 *Identification of Higher Potential Line Management Authorized Work — Technical Work Spaces*

The most significant hazard in the Engineering Division is the work associated with the shop facilities managed by the Division. This work is authorized through the HEAR database. However, in view of the detailed OSHA inspection earlier in the year, these spaces were not evaluated again.

2.2.5 *Identification of Representative Non-technical Work Space*

In view of the detailed OSHA inspection earlier in the year, these spaces were not evaluated again.

2.2.6 *Scheduling of Space Reviews/Inspections*

The team scheduled site visits to the electro-polishing facility and to the photo fabrication facility, as well as to the associated waste treatment units, with the responsible manager. The work associated with the laser AHD was reviewed by the Laser Safety Officer during the renewal of that AHD, which occurred concurrently with the IFA.

2.3 Space Reviews

Physical space reviews were limited to the ultra-high vacuum cleaning facility in Building 77, the fixed wastewater treatment unit at Building 77, the photo fabrication area in Building 25, and the fixed wastewater treatment unit at Building 25. The PRISM Laser System in Building 77 was also reviewed by Ted Decastro, Laser Safety Officer.

2.4 Interviews

Al Harcourt, the supervisor for the ultra-high vacuum cleaning and photo fabrication areas, was interviewed during the review, as was Rudy Bartolo, the operator of the photo fabrication facility.

In addition, the team met twice to discuss process and substances for the review of medical authorization and medical surveillance of Engineering Division employees. There were several follow-up communications with various supervisors in Engineering and with EH&S Division personnel concerning this subject.

Finally, the team met with Paul Knopp of Machine Tool Services to discuss the requirement for written, equipment-specific LOTO procedures.

3 Findings

3.1 Facility Authorizations

See Appendix A, List of Facility and Formal Authorizations.

3.1.1 *SADs, FSADS*

N/A.

3.1.2 *Other BAAQMD, EPA, EBMUD Permits*

The Engineering Division operates two fixed wastewater treatment units in conjunction with the ultra-high vacuum cleaning facility at Building 77 and the photo fabrication shop at Building 25.

3.1.3 *Status of the Authorizations*

These facilities are inspected by EBMUD, and compliance with the permit requirements is closely monitored by the Environmental Services Group in the EH&S Division. These facilities have operated satisfactorily without regulatory issues in recent years.

The photo fabrication facility in Building 25 is rarely used these days, and it is scheduled to be closed in the near future because of seismic concerns about the structure. This is a lengthy process, and it will involve significant expense. In view of this, it is recommended that the Engineering Division begin planning the formal closure process for the fixed wastewater treatment unit at Building 25 at this time. The process will need to include a closure plan and a closure report for submission to the Department of Toxic

Substances Control and the City of Berkeley. Soil sampling will be required as part of the closure plan.

3.2 Formal Work Authorizations

At the time of the IFA, the Engineering Division had the following formal authorizations:

AHD 164, Electronics Photo Fabrication Shop

AHD GS 1015, Ultra-High Vacuum Cleaning Facility Operations

AHD 2036, PRISM Laser System

GLA 411, Generally Licensed Authorization for the use of two analytical instruments with integral radioactive material sources; custodian, Steve Chow

SSA 120, Sealed Source Authorization; custodian, Paul Luke

SSA 122, Sealed Source Authorization; custodian, Rodney Post

SSA 175, Sealed Source Authorization; custodian, Bernhard Ludewigt

SSA 201, Sealed Source Authorization; custodian, Armin Karcher

Note that the Engineering Division also participates in the review of formal work authorizations for experiments and operations that involve Engineering Division personnel matrixed to other divisions. Since those authorizations belong to the customer divisions, these operations are reviewed as part of the IFAs for those divisions and not here.

3.2.1 *Status of Renewals*

All authorizations were current, except for AHD 2036, which was in the process of renewal. The laser system operated under this AHD had been taken out of service, pending completion of the renewal.

3.2.2 *Current Personnel*

Personnel listed on the authorizations were current: for personnel listed on the AHDs, the responsible supervisor assures this; for personnel listed on the SSAs, this is also verified by the Radiation Protection Group.

3.2.3 *Training*

All authorized personnel were current on their training. This was verified through the Training Database.

3.2.4 *Authorization Content Reflects Current Conditions and Requirements*

Authorizations reflect current conditions and requirements. This is monitored by the Division EH&S Coordinator.

3.2.5 *Technical Occupational Safety and Health Issues Review*

The IFA team also reviewed the status of medical authorizations and medical surveillance in the Engineering Division, including current approvals for respiratory protection use. To the best of our ability to determine, personnel were appropriately monitored in almost every case. However, there was one individual who had started his Laboratory career in the plating shop and later changed assignments to become a welder. This individual was never enrolled in the medical surveillance for welders, but was part of the voluntary medical examination program.

The principal issue with medical surveillance and medical authorization is a lack of feedback to the supervisors concerning medical surveillance of their staff. Periodic listings of division staff and their participation in the medical surveillance categories provided to division EH&S coordinators would enable better follow-up by divisions in this area.

3.2.6 *Validation of Hazard Identification Database (HEAR or Equivalent)*

A review of the HEAR database revealed that 100% of spaces had been updated or verified within the preceding 12 months.

3.2.7 *Work Smart Standards Envelope*

The Engineering Division is undergoing change to bring the skills and capabilities of the Division into closer alignment with the future programmatic needs of the Laboratory. However, no new work is presently anticipated that would require any change of the applicable Work Smart Standards.

3.3 Line Management ('Self-Authorization') Space/Operations

See Appendix B.

In view of earlier wall-to-wall inspections in the year, no separate assessment was conducted for this IFA. However, it should be noted that conditions in general are satisfactory.

3.3.1 *Is Line Management–Authorized Work Properly Identified?*

Line management relies on supervisors and project managers to review the work and to consult with the Division EH&S Coordinator and with EH&S Division staff as needed. There is no formal mechanism to verify this, but it seems to work well.

3.3.2 *Validation of Hazard Identification Database (HEAR or Equivalent)*

The HEAR database was reviewed, and entries for 100% of the spaces had been updated or reviewed within the past 12 months.

3.4 Nontechnical Space/Operations

In view of the earlier wall-to-wall inspections during the year, no general review of nontechnical spaces was conducted.

3.5 General Compliance Summary

General compliance with Laboratory safety requirements is excellent, with the exception of numerous machine-guarding issues that were documented by the OSHA inspection.

4 Recommendations

A few detailed findings and recommendations are noted in Attachment C.

In addition, it is noted that the correction of the machine-guarding deficiencies identified through the OSHA inspection process should be a high-priority item for the Engineering Division.

5 Noteworthy Practices

The Engineering Division EH&S Coordinator and his administrative assistant conduct formal reviews of hazards and verify that they are properly documented in the HEAR database. This is done while the Engineering Division Self-Assessment Team reviews the corresponding spaces for compliance with Berkeley Lab EH&S requirements. This is an excellent mechanism for assuring that operations are maintained within the authorized framework.

The Division suspended operation of the PRISM laser system temporarily while the authorization had lapsed during the renewal process. This is an excellent mechanism for assuring that operations requiring formal authorizations meet Laboratory requirements.

The nature of the work in the ultra-high vacuum cleaning facility in Building 77, the photo fabrication area in Building 25, and the associated fixed

wastewater treatment units pose significant EH&S challenges. EH&S management of these facilities is exemplary.

6 Conclusion

The Engineering Division has a well-managed EH&S program. All operations requiring formal authorization have the appropriate current formal authorizations. All spaces have been reviewed for hazards within the last 12 months, as reflected in the HEAR database. Staff that require medical authorizations and medical surveillance are appropriately identified and enrolled in medical surveillance, with only one exception. Spaces are generally well maintained, with few general deficiencies.

One exception is the large backlog of OSHA machine-guarding deficiencies. The Division should address these issues on a priority basis.

Appendices

Appendix A List of Facility and Formal Authorizations

Appendix B List of Line Management Operations

Appendix C Technical Occupational Safety and Health Inspection Findings

Appendix A List of Facility and Formal Authorizations

EBMUD Wastewater Fixed Treatment Unit Permit, Building 77A

EBMUD Wastewater Fixed Treatment Unit Permit, g 25

AHD 164	—	Electronics Photo Fabrication Shop (Chemicals)
AHD GS1015	—	Ultra-High Vacuum Cleaning Facility (Chemicals)
AHD 2036	—	TV Holography Measurement System (Lasers)
SSA 120	—	Sealed Source Authorization, Paul Luke
SSA 122	—	Sealed Source Authorization, Rodney Post
SSA 175	—	Sealed Source Authorization, Bernhard Ludewigt
SSA 201	—	Sealed Source Authorization, Armin Karcher
GLA 411	—	Generally Licensed Authorization, Steven Chow

Appendix B List of Line Management Operations

Bldg 25	—	Vacuum Coating, Polishing, and Lapping Shop
Bldg 25A	—	Electronics Fabrication
Bldg 46, 46A	—	Office Work
Bldg 62	—	Laboratories
Bldg 70A	—	Semiconductor Development & Fabrication
Bldg 77	—	Sheet Metal Shop, Welding Shop, Machine Shops, Paint Shop, Assembly
Bldg 77A	—	Assembly, Composite Fabrication

Appendix C Technical Occupational Safety and Health Inspection Findings

Ultra-High Vacuum Cleaning Facility, Building 77

Generally an excellent facility. AHD operations were reviewed in detail by Rob Connelly and were found satisfactory. Previous recommendation relating to high-current electrical hazards had been abated. To address a question about metal-dust hazards associated with periodic waste residue removal from the "J-Nate dryer," Rob Connelly will monitor breathing air the next time this operation is carried out.

Recommendation 1

Have the structural integrity of the support for the autoclave reviewed by the Facilities Structural Engineering Group.

Electronics Photo Fabrication Shop, Building 25

There is very little activity in this facility at the present time; it is being phased out.

Recommendation 2

Provide chemical goggles for use during pouring of chemicals at the Fixed Treatment Unit (FTU).

Recommendation 3

Provide guarding for an unguarded belt and pulley power transmission at the FTU.

Recommendation 4

In view of the planned termination of operations at Building 25, it is recommended that the Engineering Division initiate the formal closure process for the Wastewater Fixed Treatment Unit. The process is lengthy, and special funding for the process is probably needed.

Equipment Specific Lockout/Tagout (LOTO) Procedures

Recommendation 5

To come into compliance with OSHA requirements for the control of hazardous energy, it is recommended that the Engineering Division begin writing and posting equipment-specific LOTO Procedures. Each piece of equipment that cannot be brought to a zero energy state in a single step requires such procedure, including machine tools as well as research equipment.

Medical Authorizations & Medical Surveillance Program

Recommendation 6

To enable supervisors to monitor compliance with medical surveillance requirements, it is recommended that the Health Services Group provide periodic listings to the divisions of all staff participating in medical surveillance programs.